Plasmaspheric H+, He+, O+, He++, and O++ Densities and Temperatures

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Thermal plasmaspheric densities and temperatures for five ion species have recently become available, even though these quantities were derived some time ago from the Retarding Ion Mass Spectrometer onboard the Dynamics Explorer 1 satellite over the years 1981-1984. The quantitative properties will be presented. Densities are found to have one behavior with lessor statistical variation below about L=2 and another with much greater variability above that L-shell. Temperatures also have a behavior difference between low and higher L-values. The density ratio He++/H+ is the best behaved with values of about 0.2% that slightly increase with increasing L. Unlike the He+/H+ density ratio that on average decreases with increasing L-value, the O+/H+ and O++/H+ density ratios have decreasing values below about L=2 and increasing average ratios at higher L-values. Hydrogen ion temperatures range from about 0.2 eV to several 10s of eV for a few measurements, although the bulk of the observations are of temperatures below 3 eV, again increasing with L-value. The temperature ratios of He+/H+ are tightly ordered around 1.0 except for the middle plasmasphere between L=3.5 and 4.5 where He+ temperatures can be significantly higher. The temperatures of He++, O+, and O++ are consistently higher than H+.